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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/542,061	04/03/00	THOEN	E 01997-270001

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EXAMINER

MENEFEE, J

ART UNIT

PAPER NUMBER

2881

DATE MAILED: 06/06/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No.	Applicant(s)	
	09/542,061	THOEN ET AL.	
	Examiner	Art Unit	
	James Menefee	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- | | |
|---|--|
| 15) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 18) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s) _____ |
| 16) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 19) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 17) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> | 20) <input type="checkbox"/> Other: |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-3, 6, 8, 10-11, 15, 19, and 26-30 are rejected under 35 U.S.C. 102(a) as being anticipated by the art cited by applicant, Jiang.

Regarding claims 1-3, 6, and 8, Jiang discloses a laser system defining a laser cavity, the system comprising a saturable absorber for passively mode-locking the output of the system, and a semiconductor element that produces nonlinear increasing loss and necessarily has a band-edge greater than the operative wavelength as it exhibits two-photon absorption. There is a reflective structure along the optical path of the cavity, and the semiconductor material is one of the layers disposed on the reflector. The semiconductor element makes up a transmissive layer that is disposed along the optical path in the cavity.

Regarding claims 10-11, 15, and 19, Jiang discloses a laser system comprising a pump, a gain medium that inherently produces radiation at an operative wavelength when pumped by the pump, and a reflector disposed along the optical path in the cavity. The reflector comprises layers of a first semiconductor material that acts as a saturable absorber to mode-lock the laser, and layers of a second semiconductor material to

produce nonlinear increasing loss by two-photon absorption. The second semiconductor material comprises InP. The reflector contains a high reflecting coating i.e. a resonant coating.

Regarding claims 26-30 Jiang discloses passively mode-locking a laser output to provide a continuous pulse train and stabilizing the train by incorporating a semiconductor element that produces nonlinear increasing loss and exhibits two-photon absorption. The pulses are stabilized against Q-switched mode-locking, the mode-locking step including introducing a saturable absorber into the cavity. The cavity includes a mirror that comprises the semiconductor material.

Especially relevant portions of Jiang are Fig. 1, p. 1074 par. 2 - p. 1075 par. 4.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 5, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of ^{Kosah} Jiang discloses all of the limitations of claims 1, 3, and 26, but does not mention that the semiconductor material exhibits sufficient free carrier absorption to produce nonlinear increasing loss. Kosah teaches that free carrier absorption is a cause of non-linear effects in an optical system (col. 2 lines 31-62). It

would be obvious to one skilled in the art to have semiconductor material that initiates free carrier absorption so that optical nonlinear effects (i.e. nonlinear increasing loss) can be controllable, as taught by Kosah.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of the art cited by applicant, Jacobovitz-Veselka. Jiang discloses all of the limitations of claim 1, but does not mention that the system is tunable to produce radiation over a range of wavelengths. Jacobovitz-Veselka teaches that it is known to produce mode locked lasers in tunable systems (col. 3 lines 17-38). It would be obvious to one skilled in the art to make the system tunable as it is often important to be able to change the lasing wavelength over a range of wavelengths.

Claims 9, 20-25, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of Shen. Jiang discloses all of the limitations of claims 1-3, 6, 8, 10-11, 15, 19, and 26-30 as shown above. Jiang also discloses using a waveguide as the structure, more specifically an erbium-doped fiber. Included in these are all of the limitations of claims 9, 20-25, and 32-35, except these claims are claiming active mode locking rather than passive mode locking. Shen teaches that active mode locking is conventionally done using an outside modulation source, and also that active mode locking can generate pulses with small timing jitter (col. 1 lines 14-40). It would be obvious to one skilled in the art to use active mode locking rather than passive mode locking because of the smaller jitter obtained, as taught by Shen.

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Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of Feuer. Jiang discloses all of the limitations of claims 10-11 but does not mention that when light is incident on the reflector a standing wave is formed, said standing wave having local maximum in the first or second semiconductor layers. Feuer teaches a reflector with a saturable medium adjacent to it, similar to Jiang's. When light is incident on the reflector a standing wave is formed with local maxima in the saturable absorption area (col. 2 lines 12-24, col. 3 lines 40-51). It would be obvious to one skilled in the art to include such a reflector in Jiang's system because a reflector that produces local maxima in such a way can help to eliminate noise, as taught by Feuer. It would be obvious to one skilled in the art that should Feuer include a second semiconductor section then the maximum may be located in that area for the same reasons.

Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of the applicant cited art Knox. Jiang discloses all of the limitations of claims 10-11 but does not mention that when light is incident on the reflector a standing wave is formed, said standing wave having local maximum in the first or second semiconductor layers. Knox teaches a saturable reflector used in mode locking. Knox teaches a standing wave formed by incidence on the reflector, and that the intensity peak, i.e. maximum, of the standing wave should be in the quantum well regions, i.e. in the semiconductor regions (col. 3 lines 5-10). It would be obvious to one skilled in the art to include such a reflector in Jiang's system because this will affect the saturation

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intensity and placing the elements in such a way is desirable, as taught by Knox. It would be obvious to one skilled in the art that should Feuer include a second semiconductor section then the maximum may be located in that area for the same reasons.

Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang. Jiang discloses all of the limitations of claim 15 as shown above but does not mention that the first semiconductor layer should comprise InGaAs. There is also no mention that the gain medium should comprise an Er/Yb waveguide. Jiang does disclose the layer to be InGaAsP, and the use of an Er doped fiber. It would be obvious to one skilled in the art to make the layer of InGaAsP rather than InGaAs and the waveguide Er/Yb because each of these are art known substitutes and using either will give a similar result.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of the art cited by applicant, Alcock. Jiang discloses all of the limitations of claim 10 as shown above but does not mention that the reflector comprises a dielectric backmirror. Alcock shows a reflector for use in mode locking that contains a dielectric stack (abstract). It would be obvious to one skilled in the art to use this reflector because it offers a more reliable and less costly approach for the production of the mirrors, as taught by Alcock.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Menefee whose telephone number is (703) 605-4367. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Teresa Arroyo can be reached on (703) 308-4782. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JM
May 23, 2001



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